WHAT IS CLAIMED IS:

1. A device comprising:

a first substrate having a surface, said surface comprising a recognition moiety;

a mesogenic layer oriented on said surface; and

an interface between said mesogenic layer and a member selected from the group consisting of gases, liquids, solids and combinations thereof.

2. The device according to claim **1**, wherein said recognition moiety is attached to said surface by an interaction which is a member selected from the group consisting of covalent bonding, ionic bonding, chemisorption, physisorption and combinations thereof.

3. The device according to claim **1**, wherein said surface further comprises an organic layer.

4. The device according to claim **1**, wherein said recognition moiety is attached to said organic layer by an interaction which is a member selected from the group consisting of covalent bonding, ionic bonding, chemisorption, physisorption and combinations thereof.

5. The device according to claim **1**, wherein said mesogenic layer comprises a polymeric mesogen.

6. The device according to claim **1**, wherein said interface is between said mesogenic layer and air.

7. A device comprising:

a first substrate having a surface;

a second substrate having a surface, said first substrate and said second substrate being aligned such that said surface of said first substrate opposes said surface of said second substrate;

a first organic layer attached to said surface of said first substrate, wherein said first organic layer comprises a first recognition moiety; and

a mesogenic layer between said first substrate and said second substrate, said mesogenic layer comprising a plurality of mesogenic compounds.

8. The device according to claim 7, wherein at least one of said first substrate and said second substrate further comprise a metal film.

9. The device according to claim **8**, wherein said metal film is a member selected from the group consisting of gold film, platinum film, palladium film, copper film, nickel film, silver film and combinations thereof.

10. The device according to claim **7**, further comprising a second organic layer attached to said second substrate.

11. The device according to claim **10**, wherein said second organic layer comprises a second recognition moiety.

12. The device according to claim **10**, wherein said first recognition moiety and said second recognition moiety are the same.

13. The device according to claim **11**, wherein said first recognition moiety and said second recognition moiety are different.

14. The device according to claim **7**, wherein said first substrate and said second substrate are members independently selected from the group consisting of rigid substrates, flexible substrates, optically opaque substrates, optically transparent substrates, insulating substrates, conducting substrates, semiconducting substrates and combinations thereof.

15. The device according to claim **14**, wherein said first substrate and said second substrate are members independently selected from the group consisting of inorganic crystals, inorganic glasses, inorganic oxides, metals, organic polymers and combinations thereof.

16. The device according to claim **16**, wherein at least one of said first substrate and said second substrate comprise an organic polymer which is a member selected from the group consisting of permeable polymers, impermeable polymers and combinations thereof.

17. The device according to claim **16**, wherein said organic polymer is permeable and is a member selected from the group consisting of cellulosic materials, polyvinylidene fluoride, polydimethylsiloxane, track etched polycarbonate and combinations thereof.

18. The device according to claim **16**, wherein said at least one of said first substrate and said second substrate further comprise at least one permeable metal film.

19. The device according to claim **18**, wherein said at least one permeable metal film is a member selected from the group consisting of nickel film, copper film, silver film, gold film, platinum film, palladium film and combinations thereof.

20. The device according to claim **19**, wherein said at least one permeable metal film is a gold film.

21. The device according to claim **20**, wherein said gold film is an obliquely deposited gold film.

22. The device according to claim **18**, wherein said at least one permeable metal film is of a thickness between about 0.01 nanometers and about 10 nanometers.

23. The device according to claim **22**, wherein said at least one permeable metal film is of a thickness between about 1 nanometer and 10 nanometers.

24. The device according to claim **7**, wherein said surface of said first substrate and said surface of said second substrate are members independently selected

from the group consisting of rough surfaces, substantially smooth surfaces, patterned surfaces and combinations thereof.

25. The device according to claim **24**, wherein said patterned surface is produced by a method which is a member selected from the group consisting of grooving, photolithography, photoetching, chemical etching, mechanical etching, microcontact printing and combinations thereof.

26. The device according to claim **24**, wherein said pattern comprises features having a size of from about 1 micrometer to about 1 millimeter.

27. The device according to claim **26**, wherein said pattern comprises features having a size of from about 200 nanometers to about 10 micrometers.

28. The device according to claim **24**, wherein said pattern comprises at least one feature which is a member selected from the group consisting of wells, enclosures, partitions, recesses, inlets, outlets, channels, troughs, diffraction gratings and combinations thereof.

29. The device according to claim **28**, wherein said at least one feature is a plurality of wells, wherein each member of said plurality of wells is fluidically isolated from the other members of said plurality of wells.

30. The device according to claim **29**, wherein each member of said plurality of wells comprises a depression and at least one border, wherein said border extends vertically above said depression and said border comprises a compound which is a member selected from the group consisting of hydrophobic compounds, hydrophilic compounds and charged compounds.

31. The device according to claim **24**, wherein said patterned surface anchors said mesogenic layer.

32. The device according to claim 7, wherein said organic layer comprises a member selected from the group consisting of organothiols, organosilanes, amphiphilic molecules, cyclodextrins, polyols, fullerenes and biomolecules.

33. The device according to claim 10, wherein said first organic layer and said second organic layer are different.

34. The device according to claim 10, wherein said first organic layer and said second organic layer are the same.

35. The device according to claim 7, wherein said organic layer comprises

$$X^1Q_2C(CQ^1{}_2)_mZ^1(CQ^2{}_2)_nSH$$

wherein,

X^1 is a member selected from the group consisting of H, halogen and recognition moieties;

Q, Q^1 and Q^2 are independently members selected from the group consisting of H and halogen;

Z^1 is a member selected from the group consisting of —CQ_2—, —$CQ^1{}_2$—, —$CQ^2{}_2$—, —O—, —S—, —NR^4—, —$C(O)NR^4$ and $R^4NC(O)$—,

in which;

R^4 is a member selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, heteroaryl and heterocyclic groups;

m is a number between 0 and 40; and

n is a number between 0 and 40.

36. The device according to claim 35, wherein Q, Q^1 and Q^2 are independently members selected from the group consisting of H and fluorine.

37. The device according to claim 7, wherein said organic layer comprises

$$CF_3(CF_2)_mZ^1(CH_2)_nSH \text{ and } CF_3(CF_2)_oZ^2(CH_2)_pSH$$

wherein,

Z^1 and Z^2 are members independently selected from the group consisting of —CH_2—, —O—, —S—, —NR^4—, —$C(O)NR^4$ and $R^4NC(O)$—,

in which;

R^4 is a member selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, heteroaryl and heterocyclic groups;

m is a number between 0 and 40;

n is a number between 0 and 40;

o is a number between 0 and 40; and

p is a number between 0 and 40.

38. A low energy surface having a mesogenic layer anchored planarly thereon.

39. The low energy surface according to claim **38** having a surface energy of from about 1 mJ/m^2 to about 40 mJ/m^2.

40. The low energy surface according to claim **39** having a surface energy of from about 10 mJ/m^2 to about 25 mJ/m^2.

41. The low energy surface according to claim **38** comprising an organic layer.

42. The low energy surface according to claim **41**, said organic layer comprising:

$$X^1Q_2C(CQ^1_2)_mZ^1(CQ^2_2)_nSH$$

wherein,

X^1 is a member selected from the group consisting of H, halogen and recognition moieties;

Q, Q^1 and Q^2 are independently members selected from the group consisting of H and halogen;

Z^1 is a member selected from the group consisting of —CQ_2—, —CQ^1_2—, —CQ^2_2—, —O—, —S—, —NR^4—, —$C(O)NR^4$ and $R^4NC(O)$—,

in which;

R^4 is a member selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, heteroaryl and heterocyclic groups;

m is a number between 0 and 40; and

n is a number between 0 and 40.

43. The device according to claim **7**, wherein said organic layer comprises $CH_3(CH_2)_nSH$ and $CH_3(CH_2)_{n-t}SH$, wherein n is number from 2 to 40 and t is a number from 2 to 40, with the proviso that the difference n-t must be greater than or equal to 0.

44. A method for controlling tilt in an organic layer comprising a haloorganosulfur moiety, having a halogen content, adsorbed onto a substrate, said method comprising:

selecting said halogen content of said haloorganosulfur.

45. The method according to claim **44**, wherein said halogen is fluorine.

46. A method for controlling optical texture in a mesogenic layer anchored by an organic layer comprising a haloorganosulfur moiety, having a halogen content, said method comprising:

selecting said halogen content of said haloorganosulfur.

47. The method according to claim **46**, wherein said halogen is fluorine.

48. The device according to claim **7**, wherein said organic layer comprises a group having a structure:

$$—Si—R^1—(X^1)_n$$

wherein,

R^1 is a linking group between silicon and X^1;

X^1 is a member selected from the group consisting of reactive groups and protected reactive groups; and

n is a number between 1 and 50.

49. The device according to claim **48**, wherein R is a member selected from the group consisting of methyl and ethyl groups.

50. The device according to claim **48**, wherein R^1 is a member selected from the group consisting of stable linking groups and cleaveable linking groups.

51. The device according to claim **50**, wherein R^1 is a member selected from the group consisting of alkyl, substituted alkyl, aryl, arylalkyl, substituted aryl, substituted arylalkyl, saturated cyclic hydrocarbon, unsaturated cyclic hydrocarbon, heteroaryl, heteroarylalkyl, substituted heteroaryl, substituted heteroarylalkyl, heterocyclic, substituted heterocyclic and heterocyclicalkyl groups.

52. The device according to claim **50**, wherein R^1 comprises a moiety which is a member selected from group consisting of disulfide, ester, imide, carbonate, nitrobenzyl, phenacyl and benzoin groups.

53. The device according to claim **50**, wherein R^1 is a member selected from the group consisting of alkyl and substituted alkyl groups.

54. The device according to claim **48**, wherein X^1 is a member selected from the group consisting of carboxylic acid, carboxylic acid derivatives, hydroxyl, haloalkyl, dienophile, carbonyl, sulfonyl halide, thiol, amine, sulfhydryl, alkene and epoxide groups.

55. The device according to claim 7, wherein said organic layer comprises a group having the structure:

$$Y—S—R^2—(X^2)_n$$

wherein R is an alkyl group;

R^2 is a linking group between sulfur and X^2;

X^2 is a member selected from the group consisting of reactive groups and protected reactive groups;

Y is a member selected from the group consisting of H, R^3 and $R^3—S—$;

R^3 is a member selected from the group consisting of alkyl, substituted alkyl, aryl, arylalkyl, substituted aryl, substituted arylalkyl, saturated cyclic hydrocarbon, unsaturated cyclic hydrocarbon, heteroaryl, heteroarylalkyl, substituted heteroaryl, substituted heteroarylalkyl, heterocyclic, substituted heterocyclic and heterocyclicalkyl groups; and

n is a number between 1 and 50.

56. The device according to claim 55, wherein Y is a member selected from the group consisting of H, methyl and ethyl groups.

57. The device according to claim 55, wherein R^2 is a member selected from the group consisting of stable linking groups and cleaveable linking groups.

58. The device according to claim 55, wherein R^2 is a member selected from the group consisting of alkyl, substituted alkyl, aryl, arylalkyl, substituted aryl, substituted arylalkyl, saturated cyclic hydrocarbon, unsaturated cyclic hydrocarbon, heteroaryl, heteroarylalkyl, substituted heteroaryl, substituted heteroarylalkyl, heterocyclic, substituted heterocyclic and heterocyclicalkyl groups.

59. The device according to claim 57, wherein R^2 comprises a cleaveable moiety which is a member selected from group consisting of disulfide, ester, imide, carbonate, nitrobenzyl, phenacyl and benzoin groups.

60. The device according to claim 57, wherein R^2 is a member selected from the group consisting of alkyl and substituted alkyl groups.

61. The device according to claim 55, wherein X^2 is a member selected from the group consisting of carboxylic acid, carboxylic acid derivatives, hydroxyl, haloalkyl, dienophile, carbonyl, sulfonyl halide, thiol, amine, sulfhydryl, alkene and epoxide groups.

62. The device according to claim 7, wherein said recognition moiety is attached to said first substrate by a spacer arm.

63. The device according to claim 62, wherein said spacer arm comprises a member selected from the group consisting of poly(ethyleneglycol), poly(propyleneglycol), diamines and surface-active agents.

64. The device according to claim **7**, wherein said first organic layer further comprises a monovalent moiety.

65. The device according to claim **7**, wherein said recognition moiety comprises a member selected from the group consisting of organic functional groups, metal chelates, organometallic compounds and combinations thereof.

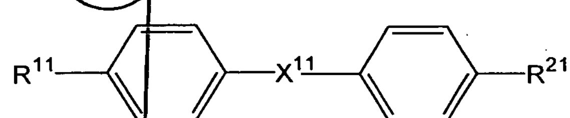
66. The device according to claim **65**, wherein said organic functional group is a member selected from the group consisting of amines, carboxylic acids, drugs, chelating agents, crown ethers, cyclodextrins and combinations thereof.

67. The device according to claim **7**, wherein said recognition moiety is biotin.

68. The device according to claim **7**, wherein said recognition moiety is a biomolecule.

69. The device according to claim **68**, wherein said biomolecule is a member selected from the group consisting of antibodies, nucleic acids, peptides, enzymes and receptors.

70. The device according to claim **7**, wherein said mesogenic layer comprises at least one compound having a structure:



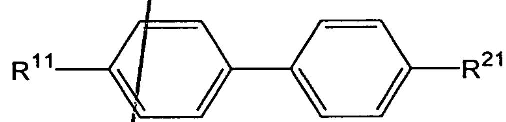
wherein,

R^{11} and R^{21} are members independently selected from the group consisting of alkyl groups, lower alkyl, substituted alkyl groups, aryl groups, acyl groups, halogens, hydroxy, cyano, amino, alkoxy, alkylamino, acylamino, thioamido, acyloxy, aryloxy, aryloxyalkyl, mercapto, thia, aza, oxo, both saturated and unsaturated cyclic hydrocarbons, heterocycles, arylalkyl, substituted aryl,

alkylhalo, acylamino, mercapto, substituted arylalkyl, heteroaryl, heteroarylalkyl, substituted heteroaryl, substituted heteroarylalkyl, substituted heterocyclic and heterocyclicalkyl; and

X^{11} is a member selected from the group consisting of —C==N—, —N==N(O)—, C==N(O)—,—HC==CH—, —C≡C— and —OC(O)—

71. The device according to claim 7, wherein said mesogenic layer comprises at least one compound having a structure:



wherein,

R^{11} and R^{21} are members independently selected from the group consisting of alkyl groups, lower alkyl, substituted alkyl groups, aryl groups, acyl groups, halogens, hydroxy, cyano, amino, alkoxy, alkylamino, acylamino, thioamido, acyloxy, aryloxy, aryloxyalkyl, mercapto, thia, aza, oxo, both saturated and unsaturated cyclic hydrocarbons, heterocycles, arylalkyl, substituted aryl, alkylhalo, acylamino, mercapto, substituted arylalkyl, heteroaryl, heteroarylalkyl, substituted heteroaryl, substituted heteroarylalkyl, substituted heterocyclic and heterocyclicalkyl groups.

72. A device according to claim 7, wherein said mesogenic layer comprises a mesogen which is a member selected from the group consisting of 4-cyano-4'-pentylbiphenyl, N-(4-methoxybenzylidene)-4-butylaniline and combinations thereof.

73. The device according to claim 7, wherein said mesogenic layer is a patterned mesogenic layer.

74. The device according to claim 7, wherein said mesogenic layer is a non-planar mesogenic layer.

75. The device according to claim **7**, wherein said mesogenic layer is tunable.

76. The device according to claim **75**, wherein said device is tunable by the application of at least one electrical field.

77. The device according to claim **75**, wherein said device affects light impinging upon it in a manner which is a member selected from the group consisting of refractive, diffractive and combinations thereof.

78. A device for detecting an interaction between an analyte and a recognition moiety, said device comprising:

a first substrate having a surface;

a second substrate having a surface, said first substrate and said second substrate being aligned such that said surface of said first substrate opposes said surface of said second substrate;

a first organic layer attached to said surface of said first substrate, wherein said organic layer comprises a first recognition moiety which interacts with said analyte; and

a mesogenic layer between said first substrate and said second substrate, said mesogenic layer comprising a plurality of mesogens, wherein at least a portion of said plurality of mesogens undergo a detectable switch in orientation upon interaction between said first recognition moiety and said analyte, whereby said presence of said analyte is detected.

79. The device according to claim **78**, wherein said analyte is a member selected from the group consisting of acids, bases, organic ions, inorganic ions, pharmaceuticals, herbicides, pesticides, chemical warfare agents, noxious gases, biomolecules and combinations thereof.

80. The device according to claim **78**, wherein said interaction is a member selected from the group consisting of covalent bonding, ionic bonding, hydrogen bonding, van der Waals interactions, repulsive electronic

interactions, attractive electronic interactions, hydrophobic interactions, hydrophilic interactions and combinations thereof.

81. The device according to claim 79, wherein said interaction is an ionic interaction and the analyte is a member selected from the group consisting of acids, bases, metal ions and metal ion binding ligands.

82. The device according to claim 79, wherein said analyte is a nucleic acid and said interaction is a hydrogen bonding interaction between said nucleic acid and a strand having an at least partially complementary sequence.

83. The device according to claim 82, wherein said interaction is between a protein and a small molecule.

84. The device according to claim 83, wherein said interaction is between an enzyme and a substrate for said enzyme.

85. The device according to claim 83, wherein said interaction is between an antibody and a complementary antigen.

86. The device according to claim 83, wherein said interaction is between biotin and avidin.

87. The device according to claim 83, wherein said interaction is between biotin and an antibiotin antibody.

88. A method for detecting an analyte, comprising:

(a) contacting with said analyte a recognition moiety for said analyte, wherein said contacting causes at least a portion of a plurality of mesogens proximate to said recognition moiety to detectably switch from a first orientation to a second orientation upon contacting said analyte with said recognition moiety; and

(b) detecting said second configuration of said at least a portion of said plurality of mesogens, whereby said analyte is detected.

89. The method according to claim **88**, wherein said analyte is a member selected from the group consisting of vapors, gases and liquids.

90. The method according to claim **89**, wherein said vapor is a member selected from the group consisting of vapors of a single compound and vapors of a mixture of compounds.

91. The method of claim **89**, wherein said gas is a member selected from the group consisting of a single gaseous compound and mixtures of gaseous compounds.

92. The method of claim **89**, wherein said liquid is a member selected from the group consisting of a single liquid compound, mixtures of liquid compounds, solutions of solid compounds and solutions of gaseous compounds.

93. The method according to claim **88**, wherein said recognition moiety comprises a member selected from the group consisting of metal ions, metal-binding ligands, metal-ligand complexes, nucleic acids, peptides, cyclodextrins, acids, bases, antibodies, enzymes and combinations thereof.

94. The method according to claim **88**, wherein from about 10 to about 10^8 mesogens undergo said switching for each molecule of analyte interacting with said analyte.

95. The method according to claim **88**, wherein from about 10^3 to about 10^6 mesogens undergo said switching.

96. The method according to claim **88**, wherein said first orientation is a member selected from the group consisting of uniform, twisted, isotropic and nematic

and said second orientation is a member selected from the group consisting of uniform, twisted, isotropic and nematic, with the proviso that said first orientation and said second orientation are different orientations.

97. The method according to claim **96**, wherein said detecting is achieved by a method selected from the group consisting of visual observation, microscopy, spectrometry, electronic techniques and combinations thereof.

98. The method according to claim **96**, wherein said visual observation detects a change in reflectance, transmission, absorbance, dispersion, diffraction, polarization and combinations thereof, of light impinging on said plurality of mesogens.

99. The method according to claim **97**, wherein said microscopy is a member selected from the group consisting of light microscopy, polarized light microscopy, atomic force microscopy, scanning tunneling microscopy and combinations thereof.

100. The method according to claim **97**, wherein said spectroscopic technique is a member selected from the group consisting of infrared spectroscopy, raman spectroscopy, x-ray spectroscopy, visible light spectroscopy, ultraviolet spectroscopy and combinations thereof.

101. The method according to claim **97**, wherein said electronic technique is a member selected from the group consisting of surface plasmon resonance, ellipsometry, impedometric methods and combinations thereof.

102. A device for synthesizing and screening a library of compounds, comprising:

(1) a synthesis component, comprising:

(a) a first substrate having a surface;

(b) a self-assembled monolayer on said surface, said monolayer comprising a reactive functionality; and

(2) an analysis component, comprising:

(a) a second substrate having a surface; and

(b) a mesogenic layer between said surface of said first substrate and said surface of said second substrate.

103. The device according to claim **102**, further comprising a second self-assembled monolayer attached to said surface of said second substrate.

104. The device according to claim **102**, wherein said second substrate is permeable to an analyte being in a physical state which is a member selected from the group consisting of liquids, gases and vapors.

105. The device according to claim **102**, wherein a member selected from said first substrate, said second substrate and both said first substrate and said second substrate further comprises a metal film.

106. The device according to claim **102**, wherein said metal film is a member selected from the group consisting of gold, nickel, copper, palladium, platinum and silver.

107. The device according to claim **102**, wherein a member selected from the group consisting of said first substrate, said second substrate and both said first and said second substrate is patterned.

108. The device according to claim **107**, wherein said member is patterned into a plurality of wells.

109. The device according to claim **102**, wherein said self-assembled monolayer comprises a member selected from the group consisting of alkanethiols, functionalized alkanethiols and combinations thereof.

110. The device according to claim **102**, wherein said functionalized alkanethiol is a member selected from the group consisting of $R^{21}CH_2(CH_2)_{14}SH$ and $R^{31}CH_2(CH_2)_{15}SH$, wherein R^{21} and R^{31} are members independently selected from the group consisting of reactive groups and recognition moieties.

111. The device according to claim **102**, wherein said first monolayer is patterned.

112. The device according to claim **102**, wherein said first monolayer is patterned into a plurality of wells.

113. The device according to claim **102**, wherein said mesogenic layer comprises a member selected from the group consisting of 4-cyan0-4'-pentylbiphenyl, N-(4-methoxybenzylidene)-4-butylaniline and combinations thereof.

114. A method for synthesizing and analyzing a combinatorial library of compounds using the device of claim **102**, said method comprising:

(a) adding a first component of a first compound to a first region of said surface of said first substrate and a first component of a second compound to a second region of said surface of said first substrate;

(b) adding a second component of said first compound to said first region of said surface of said first substrate and adding a second component of said second compound to said second region on said surface of said first substrate;

(c) reacting said first and second components to form a first product and a second product;

(d) applying said mesogenic layer to said surface of said first substrate;

(e) adding an analyte to said first region and said second region; and

(f) detecting said switch in said mesogenic layer from a first orientation to said second orientation, whereby said analyzing is achieved.

115. The method according to claim 114, wherein a library having more than 10 compounds is synthesized.

116. The method according to claim 115, wherein a library having more than 100 compounds is synthesized.

117. The method according to claim 116, wherein a library of more than 1,000 compounds is synthesized.

118. A library of compounds synthesized on a self-assembled monolayer.

119. The library according to claim 118, wherein said self-assembled monolayer comprises a member selected from the group consisting of alkanethiols, functionalized alkanethiols and combinations thereof.

120. A method of amplifying an interaction between a first molecule and a second molecule and transducing said interaction into an optical signal, said method comprising:

inducing a rearrangement in a conformation of a mesogenic layer associated with a self-assembled monolayer, wherein said rearrangement is induced by interacting said first molecule with said second molecule, said first molecule being a component of said self-assembled monolayer.